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AUTHOR Hatcher, Catherine W.; And Others
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ABSTRACT

The study compared the relationships of more easily administered intelligence screening instruments with the Wechsler Intelligence Scale for Children (WISC) to determine the validity of the Peabody Picture Vocabulary Test, the Slosson Intelligence Test, and the Raven Progressive Matrices among reading disabled children. The screening measures were administered by a trained clinician to 28 children referred to a university reading clinic for diagnosis of reading problems. The findings indicated that the Peabody, the Slosson, and the Raven scores all correlated substantially with the WISC scores and were measuring essentially the same thing as the WISC. However, the multiple correlations were not significantly higher than the single correlations. One instrument, the Slosson, appeared to be most comparable with the WISC and was suggested for general use in screening the intelligence of many disabled readers. (Author/LL)

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A Comparison of Various Measures of Intelligence with the WISC Among Disabled Readers *

by

Catherine W. Hatcher

Richard D. Arnold
Purdue University

and

L. G. Butler
Texas Tech University

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Purpose

The major purpose of this study was to compare the relationships of IQ measures obtained from the Peabody Picture Vocabulary Test (PPVT), the Slosson Intelligence Test for Children and Adults (SIT), the Raven Standard Progressive Matrices and Coloured Progressive Matrices (Raven) with the Wechsler Intelligence Scale for Children (WISC) to determine the validity of the PPVT, the SIT, and the Raven in a reading disabled population. The WISC was utilized as the criterion of concurrent validity. Specific questions of interest in the present study were:

1. Is there a significant relationship between the PPVT and the WISC Scores?

2. Is there a significant relationship between the SIT and the WISC Scores?

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3. Is there a significant relationship between the Raven and the WISC Scores?

4. Is there a significant relationship between the PPVT and the SIT and the WISC Scores?

5. Is there a significant relationship between the PPVT and Raven and the WISC Scores?

6. Is there a significant relationship between the SIT and the Raven and the WISC Scores?

7. Is there a significant relationship between the PPVT, and SIT, and the Raven and the WISC Scores?

Related Literature

Among the many aspects which have been studied in relation to reading achievement, mental ability or intelligence is generally considered to be an important factor (Bond & Tinker, 1973; Lavin, 1965). Measures of general intelligence of a child traditionally have been used to establish a child's reading potential (Bond & Tinker, 1973; Harris, 1970; Monroe, 1932). However, not every child who has the measured ability to learn to read is successful in learning this complex skill (Carter & McGinnis, 1970; Kottmeyer, 1947). Spache (1968) suggested certain limitations concerning the use of an intelligence test to predict reading ability. Among these are the following: (a) various aspects of intelligence may be related in varying degrees with each individual's performance in a complex task such as reading; (b) children may test similarly in general intelligence (IQ) and not grow similarly in reading; and (c) most intelligence tests administered in school involve reading and may represent mainly a reading score.

With reading disabled children establishing reading potential is a complex process. "The child with language and reading difficulties will not be able to show his true intellectual level on a verbal intelli-

gence test (Dechant, 1968, p. 10)." Many authors (Bond & Tinker, 1973; Carter & McGinnis, 1970, Dechant, 1968) have recommended that individual mental tests such as the Stanford Binet Intelligence Scale (Stanford Binet) or the Wechsler Intelligence Scale for Children (WISC) are the most appropriate measures for use with disabled readers. Bond and Tinker stated that the results on these tests are "...only slightly affected by the lack of reading ability of disabled readers (1973, p. 98)."

Possibly as a result of design features of the WISC, which utilizes a point scale rather than an age (as is true with the Stanford Binet) and also includes verbal and performance subtests, the WISC has become a popular instrument in researching and evaluating the disabled reader (Anastasi, 1968; Dechant, 1968; Sattler, 1974). However, the WISC is an instrument which requires highly specialized training on the part of the examiner (Anastasi, 1968; Dechant, 1968). This is a major limitation of the WISC in any reading clinic training program when students do not receive training in the Binet or Wechsler scales. A test or a combination of tests which can easily be taught to prospective reading specialists and which will yield information as effective as the WISC in assessing mental ability would be most useful. Screening tests which can be taught rapidly and easily are both less time consuming to administer and less costly to teach examiners in a clinic training program.

Several authors (Anastasi, 1968; Bond & Tinker, 1973; Sattler, 1974) have suggested screening devices that persons not highly trained in psychometric testing may learn to administer quickly and easily. Three

that appear to be most useful are: (a) Peabody Picture Vocabulary Test (PPVT), a measure of receptive vocabulary; (b) the Slosson Intelligence Test for Children and Adults (SIT), a measure of general intelligence; and (c) the Raven Progressive Matrices (Raven), a measure of nonverbal intelligence.

In a study using the PPVT as an IQ screening device for 82 primary grade children ages seven through eleven, Silberberg and Feldt (1966) found significant correlations between the PPVT and the WISC-Verbal (V) IQ ($r = .78$), the WISC-Performance (P) IQ ($r = .59$), and the WISC-Full Scale (FS) IQ ($r = .78$). Their conclusions were that the PPVT is measuring much the same ability as the WISC verbal test and therefore is useful for screening purposes. Fitsgerald, Pasewark, and Gloeckler (1970) studied the use of the PPVT with a group of 100 educationally handicapped school children. They reported correlations of the PPVT with the WISC-V IQ of .69, WISC-P IQ of .54, and WISC-FS IQ of .70. However, they reported that the mean IQ on the PPVT ($\bar{x} = 97.75$) was significantly higher than the WISC-FS, WISC-V, and WISC-P IQ mean's, 89.65, 88.68, and 92.73 respectively. These results led to their conclusions that the PPVT overestimates a WISC Verbal IQ and that the PPVT Scores are not directly comparable with those from the WISC.

While the correlations reported in the above studies are similar, the conclusions drawn are contradictory. Because little data have been reported concerning the utility of the PPVT in a reading disabled population, it is important to determine the validity of the PPVT among a group of disabled readers using the WISC as the criterion of concurrent validity.

Another screening instrument which has been utilized in studies of reading is the Slosson Intelligence Test. Houston and Otto (1968) compared the scores of poor readers of average and above average intelligence, as measured on the WISC. They reported a significant correlation ($r = .60$) between the SIT and the WISC-FS IQ. However, with such a limited range in intelligence, the generalizability of the results is questionable. Jerrolds, Callaway, and Gwaltney (1972) studied 51 children ranging in age from 6-8 to 14-7 who had been referred to a reading clinic. Their purposes were to assess the use of the SIT as a clinical measure and to determine if statistical significance remained stable over three levels of intelligence, below average (less than 89), average (90 - 110), and above average (greater than 110). For the Total Group they reported correlations between the SIT and the WISC-V IQ, WISC-P IQ, and WISC-FS IQ of .76, .51, and .74 respectively. However, the significance of the correlations did not remain stable for all three levels of intelligence. Jerrolds et al concluded that the SIT and the WISC are measuring the same thing to a statistically significant degree and that the SIT appears to be an acceptable substitute for the WISC for screening purposes.

In a comparison of the utility of the PPVT and the SIT to predict reading achievement, Miller (1972) studied 15 second- and 21 fourth-graders who were reported by the teachers as being at least one year disabled in reading. He found that the SIT yielded a more accurate description of the IQ of a reading disabled child and suggested that the SIT may be used to determine the potential of disabled readers.

Because of the contradictory conclusions reported in the studies reviewed concerning the utility of the PPVT and the SIT, more research is needed to clarify the issue of the validity of these measures as screening instruments of intelligence in clinical reading situations.

A third screening instrument which has been mentioned as useful in a reading diagnosis is the Raven Progressive Matrices. In a comparison of the Raven with the WISC-V, WISC-P, and WISC-FS IQ's, Berkemeyer (1964) studied 46 referred school children ranging in age from seven through eleven. Correlations between the Raven and the WISC-V IQ of .55, WISC-P IQ of .66, and WISC-FS IQ of .62 were reported. In a similar study with 30 Negro and Mexican American children from the ages of six through eleven, Berkemeyer reported slightly lower correlations and suggested the possibility that economic and cultural background was affecting the relationship.

Estes, Curtin, DeAurger and Denny (1961) compared the Raven with the WISC-FS IQ in a sample of 72 school children in grades one through eight. They reported a correlation of r = .55. Similar results were reported by Hall (1957) when correlating WISC-P IQ's with the Raven Scores (r = .70). The conclusions appear to be that the Raven correlates more highly with the Performance IQ of the WISC and may be an acceptable substitute for at least some level of diagnosis.

The research reviewed supports the conclusion that one test or a combination of the PPVT, SIT, and Raven should be considered for use and training purposes in clinical reading situations. However questions

remain concerning the validity of these measures when compared with the WISC Scores. Few studies have apparently been conducted with these measures among reading disabled children. If reading specialists can be easily and rapidly trained in the administration of instruments of comparable validity with the WISC, there are important implications for the content and training procedures in preparing reading specialists.

Procedures

The sample in this study included 28 students referred to the Purdue Reading Clinic for diagnosis of suspected reading difficulties. They ranged in age from 7-3 years to 14-0 years. The students were from city, suburban, and rural areas in Indiana and represented all economic and social levels.

Each subject was administered four separate intelligence measures: The Wechsler Intelligence Scale for Children, the Peabody Picture Vocabulary Test, the Slosson Intelligence Test for Children and Adults, and the Raven Standard Progressive Matrices or Coloured Progressive Matrices. The WISC's were administered and scored by advanced clinicians with specialized training in the use of this instrument. The PPVT's, SIT's, and Raven's were administered and scored by graduate students in the Diagnostic Reading Course after training in the use of these instruments by the Reading Clinic Director and staff. Administration and scoring of the instruments were carefully supervised.

Single and multiple correlation coefficients were computed. Each correlation was evaluated in terms of statistical significance. The alpha level of .05 was used. In addition, t tests were computed on the means of the PPVT, SIT, and Raven with the WISC-V, WISC-P, and WISC-FS respectively to test for differences.

As can be seen in Table 1, a significant, positive relationship exists between the PPVT and the WISC-V IQ ($r = .46$) and the PPVT and the WISC-FS ($r = .44$). The correlation between the PPVT and the WISC-P was not significant. A significant, positive relationship exists between the SIT and the WISC-V IQ ($r = .74$), the SIT and the WISC-P IQ ($r = .44$), and the SIT and the WISC-FS IQ ($r = .70$). A significant, positive relationship exists between the Raven and the WISC-V IQ ($r = .45$), the Raven and the WISC-P IQ ($r = .55$), and the Raven and the WISC-FS ($r = .60$).

In Table 2 it can be seen that a significant, positive multiple relationship exists for the PPVT and the SIT with the WISC-V IQ ($R = .74$) and the WISC-FS ($R = .70$). However, these do not differ from the simple correlations of the SIT with the WISC scales.

In addition, a significant, positive multiple relationship exists for the PPVT and Raven is shown (see Table 2) with the WISC-V ($R = .55$). WISC-P ($R = .56$) and WISC-FS ($R = .65$).

A significant, positive multiple relationship is shown for the SIT and the Raven with the WISC-V WISC-P, and WISC-FS, $R = .76$, $R = .59$, and $R = .78$ respectively (see Table 2).

TABLE 1

Correlations of the PPVT, SIT, and Raven
with the WISC-V, WISC-P, and WISC-FS

TEST	WISC-V r	WISC-P r	WISC-FS r
PPVT	.46*	.29	.44*
SIT	.74**	.44*	.70**
Raven	.45*	.55**	.60**

*p < .01
**p < .001

TABLE 2

Summary of the Multiple Correlations for the PPVT, SIT, and Raven
with the WISC-V, WISC-P, and WISC-FS

TESTS	WISC-V R	WISC-V R^2	WISC-P R	WISC-P R^2	WISC-FS R	WISC-FS R^2
PPVT and SIT	.74**	.554	.44	.196	.70**	.490
PPVT and Raven	.55*	.303	.56**	.308	.65**	.416
SIT and Raven	.76**	.574	.59**	.353	.78**	.605
PPVT, SIT, and Raven	.76**	.575	.59*	.354	.78**	.605

*p < .05
**p < .01

It can be seen that a significant, positive multiple relationship exists between the PPVT, the SIT, and the Raven with the WISC-V, R = .76, with the WISC-P, R = .59, and with the WISC - FS, R = .78. However, these multiple correlations do not differ from those reported above for the SIT and the Raven with the WISC scales.

The means and standard deviations for each test are presented in Table 3. Student's t tests were computed to compare the PPVT, the SIT, and the Raven test means with the WISC-V, WISC-P, and the WISC-FS test means respectively. The results of the t tests are shown in Table 4. It can be seen from the data that both the PPVT and Raven means are significantly above the WISC Verbal mean.

A correlation matrix for the PPVT, SIT, Raven, WISC-V, WISC-P, and WISC-Fs is presented in Table 5.

Discussion and Implications

The findings of this study indicate that the Peabody, the Slosson and the Raven scores all correlate substantially with the WISC Scores and appear to be measuring the same thing to a statistically significant degree. The correlations reported here are comparable with those published in other studies (Berkemeyer, 1964; Estes, Curtin, DeBruger, & Denny, 1961; Fitzgerald, Pasewark, & Gloeckler, 1970; Houston & Otto, 1968; Jerrolds, Callaway, & Gulatney, 1972; Silberberg & Feldt, 1966). In addition, among the three measures investigated, the Slosson yields the highest

TABLE 3

Means and Standard Deviations for Intelligence Tests

TEST	MEAN	S.D.
PPVT	96.29	13.14
SIT	90.61	16.08
Raven	100.36	15.49
WISC-V	89.04	10.94
WISC-P	98.46	13.66
WISC-FS	93.46	11.38

TABLE 4

Student's t Test of the Means of the PPVT, the SIT, and the Raven with the WISC Scores

TEST	WISC-V	WISC-P	WISC-FS
PPVT	2.24*	n.s.	n.s.
SIT	n.s.	n.s.	n.s.
Raven	3.55**	n.s.	n.s.

* $p < .05$
** $p < .01$

TABLE 5

Correlation Matrix

Test	PPVT	SIT	Raven	WISC-V	WISC-P	WISC-FS
PPVT						
SIT	.575					
Raven	.377	.422				
WISC-V	.463	.743	.450			
WISC-P	.290	.440	.543	.435		
WISC-FS	.436	.698	.605	.819	.856	

correlation coefficients with the WISC-Verbal Scale and Full Scale. While the mean score of the Slosson (90.61) is slightly below that of the WISC-Full Scale (93.46), the difference is not statically significant and the standard deviation of the two scales is quite similar. The obtained differences also seem to have little clinical or educational significance. The Slosson Intelligence Test appears to be the best of the three screening instrument used in this study to measure the intelligence of disabled readers.

Efforts to describe disabled readers in terms of a WISC "profile" have not been particularly successful. Kender (1972) in a review of eight studies in this area concluded that no valid generalizations could be made about a WISC profile for poor readers. Clinical programs designed to train the use and interpretation of an individual intelligence test such as the WISC are both time-consuming and expensive to administer. The results of this study indicate that in general the use of the WISC in a reading clinic is not warranted, although for particular instances it may be quite useful. Replication of this study might warrant the following generalization: Most diagnoses probably could be conducted with the use of the Slosson as a screening device for intelligence, saving time for both the child and the diagnostician.

The question is raised concerning the need for the specialized use of the WISC in reading diagnoses and whether having the additional information available will make a difference in planning a remedial program.

Kender recommended that further research utilizing the WISC be directed to attempting to understand the implications the WISC subtests may have for the complex process called reading. While further research is necessary to answer the question involving the identification of tasks on the WISC similar to tasks involved in reading, it appears that the reading specialist trained to administer the Slosson to screen intelligence will have adequate training to judge reading potential for many disabled readers.

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